

A tipping bucket raingage was installed at the request of DOT personnel near the downstream station in the fall of 2003. The raingage was connected to the automated sampler to store the data.

Results of Monitoring: At the request of Ted Sherrod, samples collected from 2 storms were analyzed individually to characterize the within storm variability of TSS and turbidity. Results of the sample analysis along with concurrent discharge are shown in figure 5 for storms occurring in March and April of 2004. Each bar represents 5 individual samples that were placed in one sample bottle and analyzed; therefore, the bar represents a longer period of the hydrograph than is indicated by its width. As seen in the figures, the highest turbidity occurs near the highest discharge rate. This also indicates that the highest TSS concentrations correspond to the highest discharge rate, which is consistent with other studies that show that most of the sediment is transported during storm flow. The turbidities of other samples varied, but those during the falling limb of the hydrograph were similarly moderately elevated from pre-storm levels.

Summary statistics for the monitoring data are shown in Tables 2 and 3. The mean, median, and range were computed from the 2-week composite or total for the periods when the samples were collected. The total was computed for the entire period of monitoring. Rainfall for the monitoring period totaled 64.5 inches or 35.4 inches/year, which is slightly less than the long-term annual rainfall for the area.

Discharge measured at the downstream site was greater than upstream; however, the difference was similar to the uncertainty of the measurements. In any monitoring data a certain amount of uncertainty or unexplained variability exists. This is particularly the case for a surface water body of the size of Crane Creek, because most of its discharges are too high for measurement with flow measuring devices such as weirs or flumes; hence, a stage-discharge relationship was developed. There are several sources of error in this method, the biggest being that it depends on the creek channel remaining relatively stable so that the stage-discharge relationship doesn't change over time. At Crane Creek both upstream and downstream stations have had shifting sediment bars during the monitoring, thereby creating the possibility of changing relationships, which would introduce error or uncertainty. In addition, there is error in the actual measurement of discharge at a given depth and error associated with not measuring discharge at every depth, especially at high discharges. The highest discharge measured was 73 cfs; however, much higher flows occurred, which could not be measured due to accessibility or time constraints. Often, the higher flows are measured off of a bridge over the creek, but there was no bridge available in this case. These factors combine to produce an estimated 15% uncertainty in discharge measurements at both sites, or 2,061 Mgal for upstream and 2,430 Mgal for downstream. Both of these uncertainty values are only slightly less than the difference indicating that the difference in total discharge is likely not significant from an uncertainty in monitoring standpoint.

The mean, median, and range for the bi-weekly discharge were greater at the downstream site (Table 2 column 3). Results of a paired t-test on the bi-weekly discharge data from both sites suggested that they were statistically different at the 0.05 level of significance. This test included periods for which both sites had discharge data with no apparent problems (39 of the 46 periods). The significant increase was expected given that 260 additional acres drained to the downstream site and that most of those acres were cleared. As shown in Table 2, the biweekly discharges had a considerable range reflecting both the wet and dry conditions experienced during the project.